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(54) **METHODS AND SYSTEMS FOR PREVENTING MALICIOUS USE OF PHISHING SIMULATION RECORDS**

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CPC ***G06F 21/55*** (2013.01); ***H04L 63/1483*** (2013.01)

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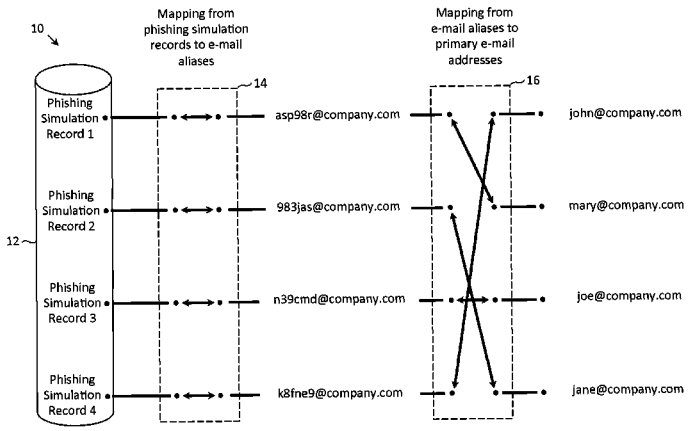
(57) **ABSTRACT**

Described herein are methods, network devices and machine-readable media for preventing the malicious use of phishing simulation records. Phishing simulation records often times can reveal which individuals are most susceptible to phishing attacks. In the event that an attacker gains access to these records, the attacker can exploit such information to send phishing attacks to those individuals who are the most susceptible. To address such vulnerabilities, a phishing simulation record of an individual is only associated with an e-mail alias of the individual. Further, such e-mail alias may be deactivated after phishing simulations have been completed. Therefore, even if an attacker were able to identify individuals most susceptible to phishing attacks, the attacker will be unable to send any phishing attacks to those individuals since their e-mail aliases will have been deactivated.

17 Claims, 5 Drawing Sheets



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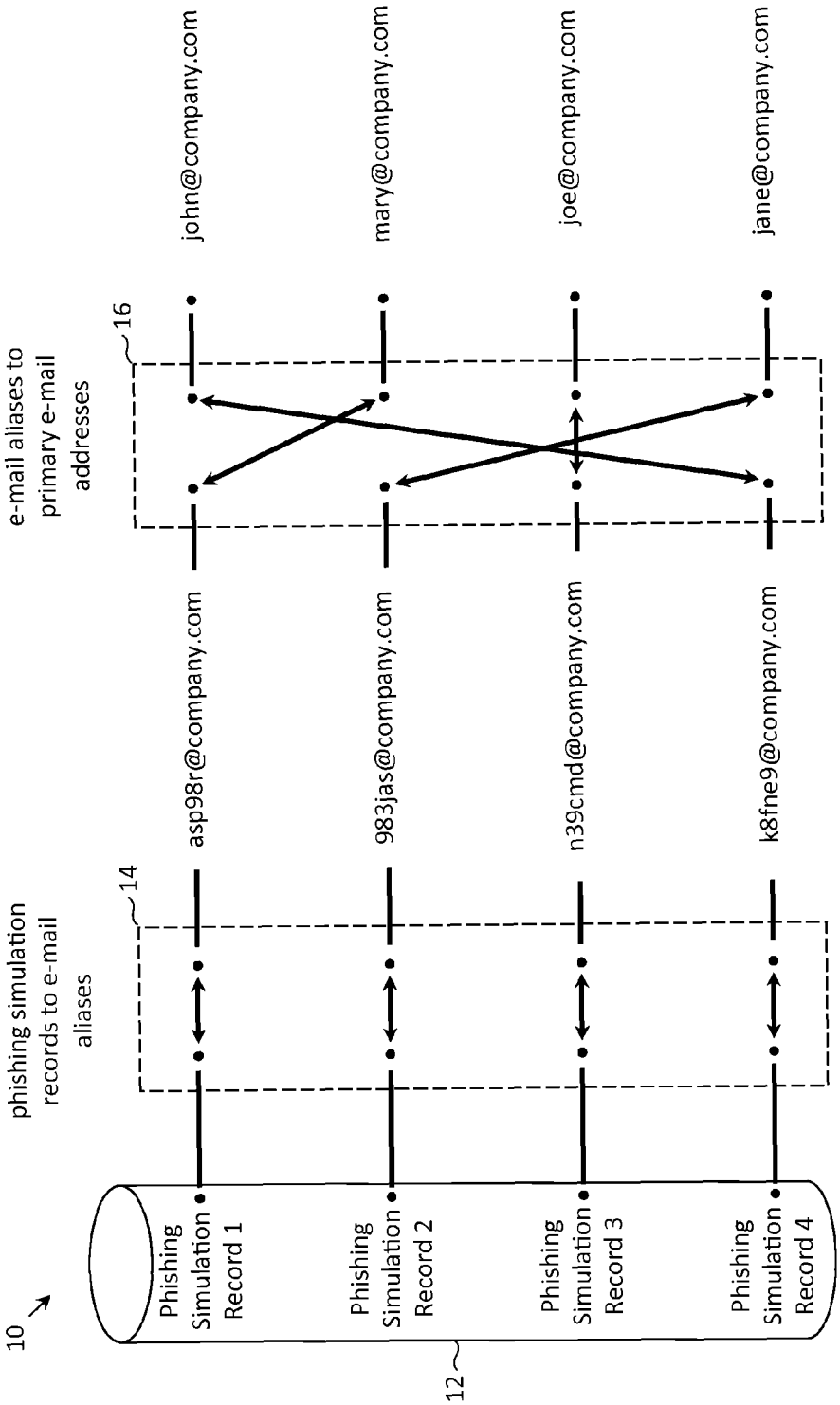
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jane@company.com

Fig. 1

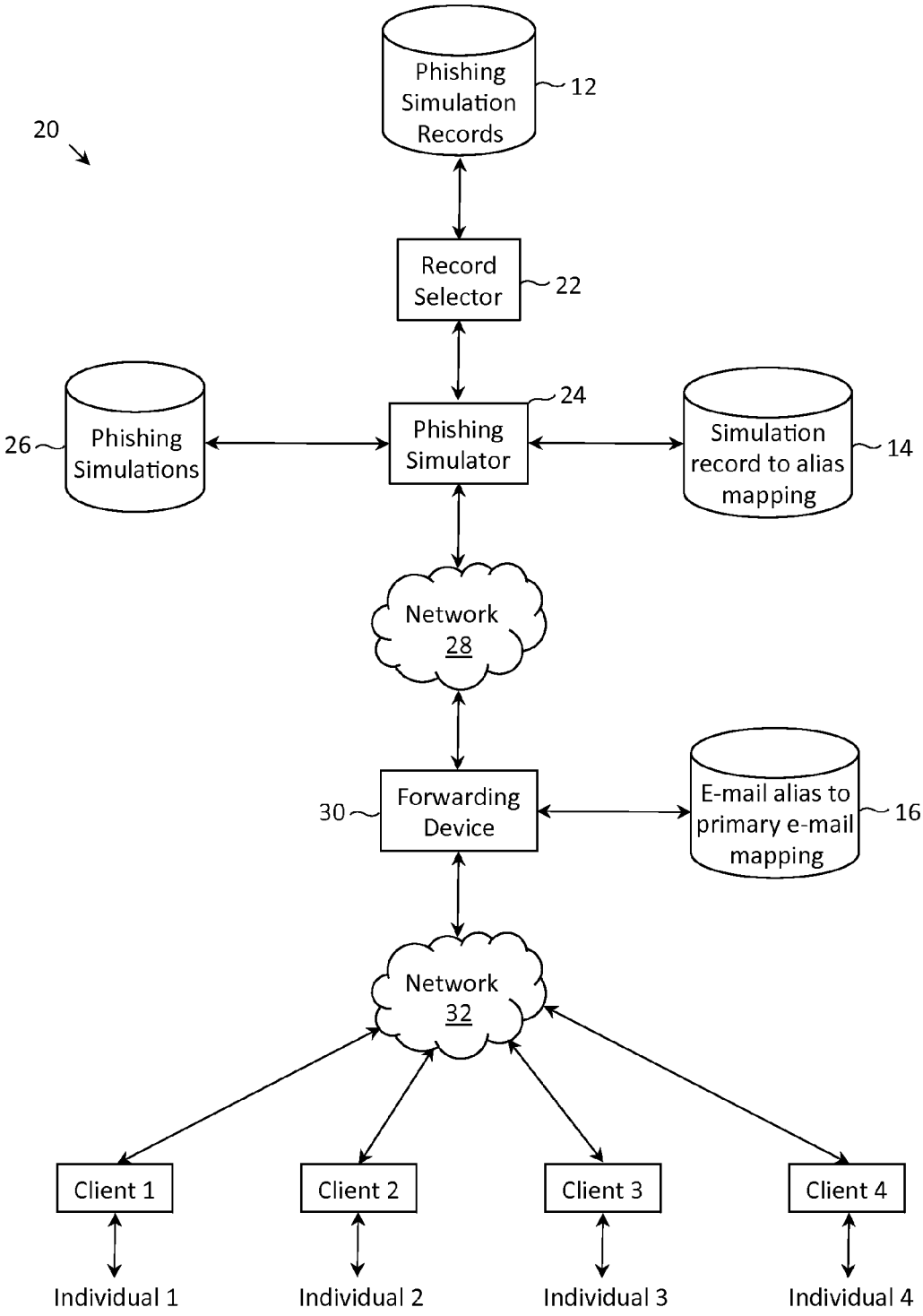
20
Phishing Simulation Records
12
Record Selector
22
Phishing Simulations
26
Phishing Simulator
24
Simulation record to alias mapping
14
Network 28
Forwarding Device
30
E-mail alias to primary e-mail mapping
16
Network 32
Client 1
Client 2
Client 3
Client 4
Individual 1
Individual 2
Individual 3
Individual 4

Fig. 2

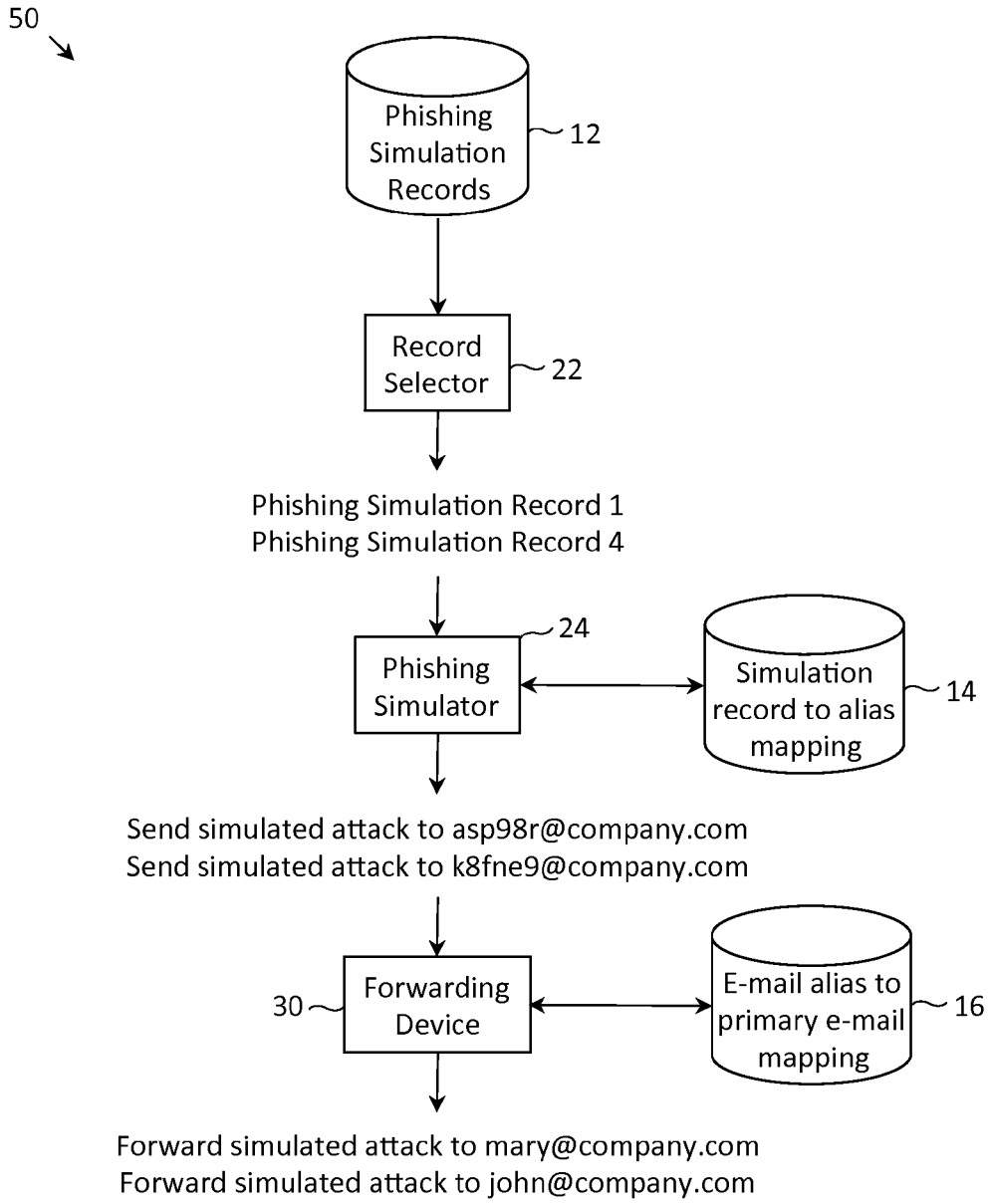
50
Phishing Simulation Records
12
Record Selector
22
Phishing Simulation Record 1
Phishing Simulation Record 4
24
Phishing Simulator
Simulation record to alias mapping
14
Send simulated attack to asp98r@company.com
Send simulated attack to k8fne9@company.com
30
Forwarding Device
E-mail alias to primary e-mail mapping
16
Forward simulated attack to mary@company.com
Forward simulated attack to john@company.com

Fig. 3

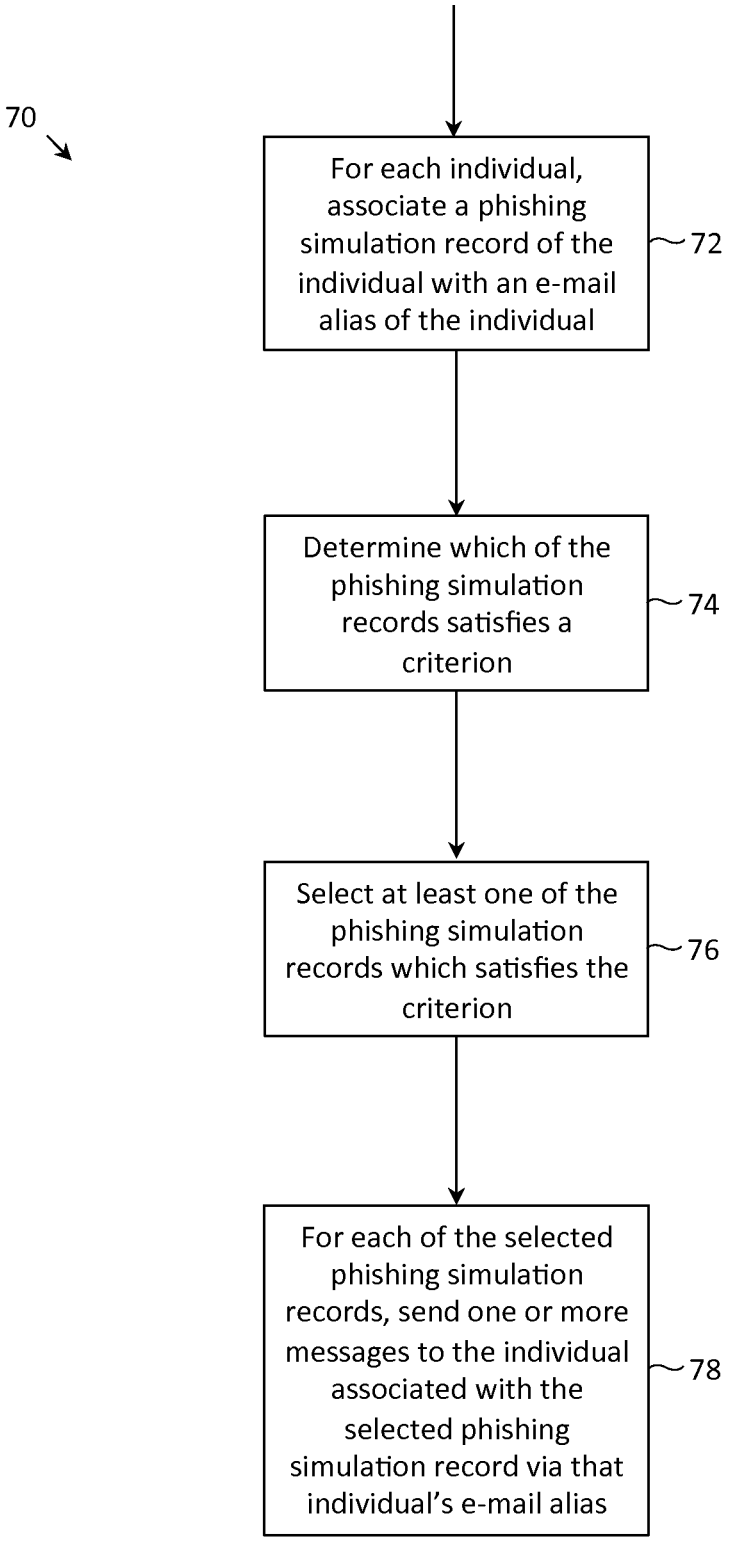
70
For each individual, associate a phishing simulation record of the individual with an e-mail alias of the individual
72
Determine which of the phishing simulation records satisfies a criterion
74
Select at least one of the phishing simulation records which satisfies the criterion
76
For each of the selected phishing simulation records, send one or more messages to the individual associated with the selected phishing simulation record via that individual's e-mail alias
78

Fig. 4

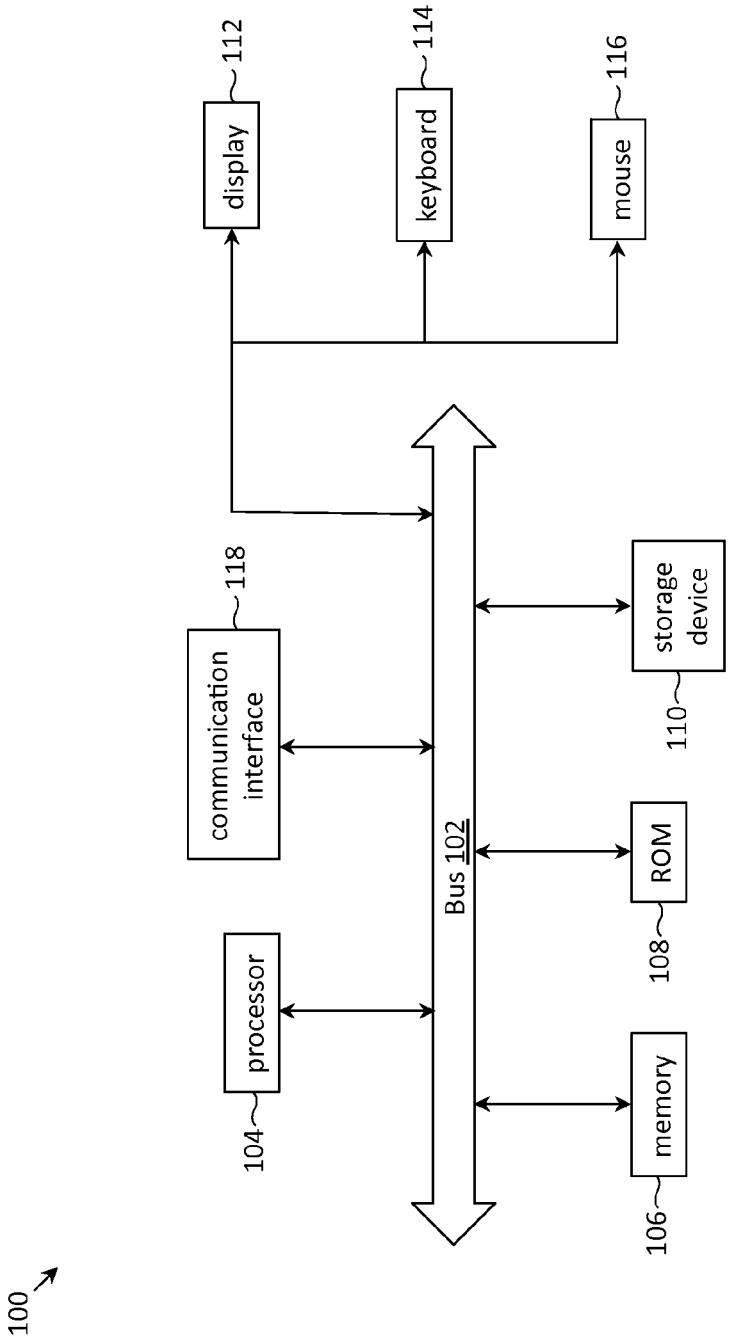
100
display
112
keyboard
114
mouse
116
communication interface
118
storage device
110
Bus 102
ROM
108
processor
104
memory
106

Fig. 5

METHODS AND SYSTEMS FOR PREVENTING MALICIOUS USE OF PHISHING SIMULATION RECORDS

FIELD OF THE INVENTION

The present invention relates to methods, network devices and machine-readable media for preventing the malicious use of phishing simulation records, and more particularly relates to techniques for decoupling phishing simulation records from the contact information of individuals by means of an e-mail alias.

BACKGROUND

In a phishing attack, an individual (e.g., a person, an employee of a company, a user of a computing device) receives a message, commonly in the form of an e-mail or other electronic communication, directing the individual to perform an action, such as opening an e-mail attachment or following (e.g., using a cursor controlled device or touch screen) an embedded link. If such message were from a trusted source (e.g., co-worker, bank, utility company or other well-known and trusted entity), such action might carry little risk. Nevertheless, in a phishing attack, such message is from an attacker (e.g., an individual using a computing device to perform a malicious act on another computer device user) disguised as a trusted source, and an unsuspecting individual, for example, opening an attachment to view a "friend's photograph" might in fact install spyware, a virus, and/or other malware (i.e., malicious computer software) on his/her computer. Similarly, an unsuspecting individual directed to a webpage made to look like an official banking webpage might be deceived into submitting his/her username, password, banking account number, etc. to an attacker.

While there are computer programs designed to detect and block phishing e-mails, phishing attacks methods are constantly being modified by attackers to evade such forms of detection. More recently, training programs have been developed to train users to recognize phishing attacks, such training involving simulated phishing attacks. While such training is beneficial, training programs may accumulate certain information about the users, which, if exploited by an attacker (e.g., attacker were able to gain access to same), could cause great harm to the participants of the training programs. The present invention addresses such potential vulnerabilities of training programs.

SUMMARY OF THE INVENTION

The inventors have realized that training programs (e.g., providing employees of a company with simulated phishing attacks, followed by training materials), may collect certain information that could be exploited by an attacker. For example, training programs may maintain a measure of each individual's susceptibility to simulated phishing attacks. If an attacker were to gain access to such information, the attacker could specifically target those individuals determined to be highly susceptible to phishing attacks. Indeed, it would be ironic, but nevertheless detrimental, that a program designed to protect individuals from phishing attacks could be exploited by an attacker to more effectively attack the individuals.

One approach to addressing such vulnerability is to decouple any phishing simulation record of an individual from his/her personal information (e.g., name, birth date, age, gender, etc.) and/or contact information (e.g., mailing address, telephone number, mobile number, e-mail address, etc.). That way, even if an attacker were to gain access to phishing simulation records (e.g., records of the number of phishing simulations an individual falls victim to, which types of phishing simulations an individual falls victim to, a measure of an individual's susceptibility to phishing attacks), the attacker would not be able to utilize such information in a manner that harms the individuals associated with the phishing simulation records.

At the same time, a training program is posed with the conflicting need to associate such phishing simulation records of individuals with those individual's contact information. Upon identifying those individuals most susceptible to phishing attacks, a training program would ideally be able to provide those individuals with targeted and/or additional training materials.

To satisfy both goals of protecting simulation records from being exploited by an attacker and allowing a training program to provide individuals with targeted and/or additional training materials, the inventors propose, in one embodiment of the invention, to associate each phishing simulation record of an individual with an e-mail alias of the individual. Any messages (e.g., simulated attacks, training materials) sent to the e-mail alias would be forwarded to a primary e-mail address of the individual, enabling the proper operation of a training program. Such e-mail alias, however, would be rendered invalid after a certain time period (e.g., after a simulation program has been completed) so that even if an attacker were to gain access to the phishing simulation records, the attacker would not be able to exploit same.

These and further embodiments of the present invention are discussed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not limitation, in the figures of the accompanying drawings in which:

FIG. **1** depicts a schematic illustrating a mapping from phishing simulation records to e-mail aliases and a mapping from e-mail aliases to primary e-mail addresses, according to one embodiment of the invention;

FIG. **2** depicts a system diagram of components used in the administration of phishing simulations to individuals, according to one embodiment of the invention;

FIG. **3** depicts a specific example of how phishing simulations are administered to individuals via their e-mail aliases, according to one embodiment of the invention;

FIG. **4** depicts a flow diagram of a process to administer phishing simulations to individuals via their e-mail aliases, according to one embodiment of the invention; and

FIG. **5** depicts components of a computer system in which computer readable instructions instantiating the methods of the present invention may be stored and executed.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration specific embodiments in which the invention may be practiced. It is understood that other embodiments may be utilized and structural changes may be made without departing from the scope of the present invention.

As depicted in schematic **10** of FIG. **1**, phishing simulation records **12** may be associated with e-mail aliases (e.g., asp98r <at> company <dot> com, 983jas <at> company <dot> com,

etc.) via mapping **14**. In the example of FIG. **1**, phishing simulation records of four individuals are depicted, and each of the phishing simulation records is associated with an e-mail alias of each of the individuals. While four phishing simulation records are depicted for ease of discussion, any number of phishing simulation records may be present. For example, phishing simulation record 1 is associated with the e-mail alias asp98r <at> company <dot> com. In turn, each of the e-mail aliases is associated with a primary e-mail address via mapping **16**. For example, the e-mail alias asp98r <at> company <dot> com is associated with the primary e-mail address mary <at> company <dot> com. It is noted that, in the example provided in FIG. **1**, the domain names of the e-mail aliases and the primary e-mail addresses are the same (i.e., both are company <dot> com), but this is not necessarily so. In another example, an e-mail alias could be asp98r <at> company <dot> com, while the primary e-mail address associated with such e-mail alias could be mary <at> gmail <dot> com.

The phrase "primary e-mail address", in embodiments of the invention, refers to a more permanent e-mail address of an individual. This could be a company e-mail address, a personal e-mail address, etc. The primary e-mail address often incorporates one or more of the individual's first name, last name, nickname and other identifier of the individual in the local-part of the e-mail address (i.e., where the "local-part" of an e-mail address is the sequence of characters before the "<at>" symbol), but this is not always so. In practice, a person could have more than one primary e-mail address. For instance, a person could have a gmail address for personal use and a company e-mail address for professional use. Either (or both) of these e-mail address could be considered a primary e-mail address.

An e-mail alias is a forwarding e-mail address (i.e., messages sent to an e-mail alias of an individual are forwarded to the primary e-mail address of the individual). An e-mail alias of an individual may be established after the individual's primary e-mail address has been established, but this is not always so. Other than these functional and/or temporal distinctions, an e-mail alias may be quite similar to a primary e-mail address. Like a primary e-mail address, an e-mail alias may incorporate one or more of the individual's first name, last name, nickname and other identifier of the individual. Like a primary e-mail address, an e-mail alias could be in use for a long period of time.

However, e-mail alias, in accordance with embodiments of the present invention, may be constructed in a more restrictive and/or limited fashion than e-mail aliases currently in use. Typically, an e-mail alias of an individual, in accordance with embodiments of the present invention, does not incorporate any characteristic that may be associated with the identity of the individual (e.g., does not include the individual's first or last name, initials, nickname, birthday, etc.) and/or any other characteristic that could be used by an attacker to determine the identity/contact information of an individual. In practice, the local part of an e-mail alias may include a randomly generated sequence of alpha-numeric characters (e.g., "aa039js"). The local part of an e-mail alias may also include special characters (e.g., !, #, $, etc.) in addition to alpha-numeric characters, although there may be restrictions on the use of these special characters. Such details may be found in RFC 5322 and RFC 6531 and will not be discuss in further detail herein. FIG. **1** provides several example e-mail aliases which are suitable for protecting the identity/contact information of an individual. For instance, without the knowledge of mapping **16**, there really would be no way for an attacker (or anyone for that matter) to ascertain the primary e-mail address associated with the e-mail alias asp98r <at> company <dot> com.

Typically, an e-mail alias, in accordance with embodiments of the present invention, is active (e.g., able to send/receive messages) for a limited duration of time (e.g., 1 hour, 1 day, etc.). When an e-mail alias is active, any messages sent to the e-mail alias of an individual may be forwarded to the primary e-mail address of the individual. When an e-mail alias is inactive, any messages sent to the e-mail alias may not be forwarded to the associated primary e-mail address.

More particularly, the duration of time that an e-mail alias is active may correspond to the time during which a phishing simulation is being conducted. Before a phishing simulation begins, an e-mail alias may be created for and assigned to an individual. During the phishing simulation, phishing simulations and/or training material may be sent to the individual via the individual's e-mail alias. Any responses from the individual may also be received via the e-mail alias. More specifically, the individual may use his/her primary e-mail address to send a message (e.g., reply to a phishing simulation). Such message may then be forwarded from the primary e-mail address to the e-mail alias, so that the training program receives any response from the individual via his/her e-mail alias rather than via his/her primary e-mail address. Such technique decouples the training program from any primary e-mail addresses of individuals of the training program, precluding any information collected by the training program from being used to mount an attack on the individuals. When the phishing simulation concludes, the e-mail alias may be made inactive.

FIG. **2** depicts system diagram **20** of components used in the administration of phishing simulations to individuals, according to one embodiment of the invention. Phishing simulation records **12** (of FIG. **2**) is a more compact representation of the collection of phishing simulation records **12** (of FIG. **1**). More specifically, a phishing simulation record may comprise a measure of an individual's susceptibility to phishing attacks. The measure may include numbers from 1 to 10, with 1 indicating low susceptibility and 10 indicating high susceptibility. Alternatively, the measure may include a percentage from 0% to 100%, with 0% indicating that an individual has fallen victim to none of the phishing simulations and 100% indicating that the individual has fallen victim to all of the phishing simulations. Alternatively and/or in addition, a phishing simulation record may comprise the number of phishing simulations that an individual has fallen victim to. Alternatively and/or in addition, a phishing simulation record may indicate whether an individual has received and/or has reviewed training materials provided by the training program.

As depicted in FIG. **2**, phishing simulation records **12** may be communicatively coupled to record selector **22**. Record selector **22**, in one embodiment of the invention, may determine which of the phishing simulation records satisfies a criterion. For example, record selector **22** may determine which of the phishing simulation records has a measure of phishing susceptibility that exceeds a certain threshold. As another example, record selector **22** may determine which of the phishing simulation records contain a record of individuals falling victim to more than ten phishing simulations. Record selector **22** may then select at least one of the phishing simulation records that satisfies the criterion. In one instance, record selector **22** may select all of the phishing simulation records that satisfy the criterion. As a specific example, record

selector **22** may select "Phishing Simulation Record 1" and "Phishing Simulation Record 4", as depicted in process **50** of FIG. **3**.

As depicted in FIG. **2**, record selector **22** may be communicatively coupled to phishing simulator **24**. Based on information provided by record selector **22**, phishing simulator **24** may be instructed to provide phishing simulations and/or training materials to individuals associated with certain phishing simulation records. Phishing simulator **24** may retrieve specific phishing simulations and/or training materials from phishing simulation data store **26**, those simulations and/or materials retrieved being properly matched to an individual associated with a selected phishing simulation record. For example, based on information from a phishing simulation record that an individual consistently fails to recognize phishing simulations with personalized salutations, phishing simulator **24** may provide that individual with training materials designed to increase his/her awareness of phishing simulations with personalized salutations.

Phishing simulator **24** may access data store **14** which stores a mapping from phishing simulation records to e-mail aliases in order to determine an e-mail address through which an individual associated with a phishing simulation record can be contacted. As a specific example, phishing simulator **24** may access data store **14** to determine that e-mail alias asp98r <at> company <dot> com is associated with phishing simulation record 1, and e-mail alias k8fne9<at> company <dot> com is associated with phishing simulation record 4. Based on information from record selector **22**, phishing simulation data store **26** and simulation record to alias mapping data store **14**, phishing simulator **24** may send messages (e.g., phishing simulations and/or training materials) to certain e-mail aliases via network **28**. Continuing with the specific example provided in FIG. **3**, phishing simulator **24** may send a simulated attack to asp98r <at> company <dot> com and a simulated attack to k8fne9<at> company <dot> com.

Subsequently, forwarding device **30** may detect that one or more messages have been sent to an individual's e-mail alias. Relying upon a mapping from e-mail aliases to primary e-mail addresses provided in data store **16**, forwarding device **30** may forward the one or more messages to a primary e-mail address of the individual. More specifically, the one or more messages may be forwarded to an e-mail inbox of the individual, as identified by the primary e-mail address of the individual, via network **32** and the individual's client machine. Returning to the specific sample of FIG. **3**, a simulated attack sent to asp98r <at> company <dot> com may be forwarded to mary <at> company <dot> com, and a simulated attack sent to k8fne9<at> company <dot> com may be forwarded to john <at> company <dot> com, in accordance with the mapping provided in data store **16**.

After phishing simulations have concluded (or after a certain time duration has elapsed from the instant the e-mail aliases were created), one or more of the e-mail aliases may become invalid, preventing those individuals whose e-mail aliases have become invalid (or deactivated) from receiving any further messages from their respective e-mail aliases while their respective e-mail aliases are invalid. An e-mail alias may be rendered invalid by removing certain associations from the mapping provided in data store **16**. For instance, to render the e-mail alias asp98r <at> company <dot> com invalid, one may remove the association between asp98r <at> company <dot> com and mary <at> company <dot> com. Alternatively, such association from e-mail alias to primary e-mail address could be preserved in data store **16**, but forwarding device **30** could be instructed to (temporarily) stop forwarding any messages from asp98r <at> company <dot> com to mary <at> company <dot> com. Indeed, e-mail aliases need not be permanently deactivated. Instead, they could be deactivated at the end of one phishing simulation and reactivated during a subsequent phishing simulation.

As discussed above, a primary reason for using e-mail aliases and rendering them inactive after a certain period of time is to thwart an attacker's attempt to exploit phishing simulation records (in the event that the attacker gains access to same). In accordance with techniques of one embodiment of the invention, even if the attacker has knowledge that an individual is highly susceptible to phishing attacks, such knowledge is of little use if the attacker has no way of contacting the individual (e.g., the attacker could attempt to send a phishing attack to an e-mail alias, but such attack would fail to reach the intended individual in the event that the e-mail alias has been rendered inactive).

An underlying assumption in FIG. **2** is that data store **14** is separate from data store **16** such that even if an attacker were to gain access to data store **14**, the attacker does not automatically also gain access to data store **16**. In one embodiment of the invention, data store **14** may be physically separated from data store **16** (e.g., data store **14** and data store **16** may be separate devices and/or may be separated by network **28**).

In a variation of FIG. **2**, phishing simulator **24** may be directly coupled to forwarding device **30** (i.e., network **28** is not present). In such embodiment, the mapping present in data store **14** and the mapping present in data store **16** may be stored in a common data storage device. To thwart an attacker from gaining knowledge of the association between phishing simulation records and primary e-mail addresses (and subsequently attacking individuals who participate in the training program), the mapping from e-mail aliases to primary e-mail addresses may be stored in an encrypted manner. As such, even if in attacker were to gain access to the phishing simulation records, the attacker will be unable to contact individuals associated with the phishing simulation records (assuming that the e-mail aliases have been rendered invalid).

In the discussion above, references have been made to a "training program". Such "training program" may include one or more of the components of FIG. **2**: phishing simulation records **12**, record selector **22**, phishing simulator **24**, phishing simulations **26** and simulation record to alias mapping **14**. Forwarding device **30** and e-mail alias to primary e-mail mapping **16** may be present in a mail server which is coupled to the training program via network **28**.

FIG. **4** depicts flow diagram **70** of a process to administer phishing simulations to individuals via e-mail aliases, according to one embodiment of the invention. At step **72**, for each individual, a phishing simulation record of the individual may be associated with an e-mail alias of the individual. Such association may be recorded in data store **14**, as described above. At step **74**, record selector **22** may determine which of the phishing simulation records satisfies a criterion. At step **76**, record selector **22** may select at least one of the phishing simulation records which satisfies the criterion. Finally, at step **78**, phishing simulator **24** may, for each of the selected phishing simulation records, send one or more messages to the individual associated with the selected phishing simulation record via that individual's e-mail alias.

While embodiments of the present invention have been described in the context of preventing an attacker from maliciously using phishing simulation records, there may be other contexts for which decoupling a phishing simulation record from an individual's personal/contact information using an e-mail alias would be beneficial. For instance, privacy laws or a company's Chief Privacy Officer may want to preclude phishing susceptibility attribution. That is, a company's

objective is typically to reduce its employees' susceptibility to phishing attacks, and not necessarily to specifically know who is most susceptible.

As is apparent from the foregoing discussion, aspects of the present invention involve the use of various computer systems and computer readable storage media having computer-readable instructions stored thereon. FIG. **5** provides an example of computer system **100** that is representative of any of the client/server devices discussed herein. Further, computer system **100** is representative of a device that performs the process depicted in FIG. **4**. Note, not all of the various devices discussed herein may have all of the features of computer system **100**. For example, certain devices discussed above may not include a display inasmuch as the display function may be provided by a client computer communicatively coupled to computer system **100** or a display function may be unnecessary. Such details are not critical to the present invention.

Computer system **100** includes a bus **102** or other communication mechanism for communicating information, and a processor **104** coupled with the bus **102** for processing information. Computer system **100** also includes a main memory **106**, such as a random access memory (RAM) or other dynamic storage device, coupled to the bus **102** for storing information and instructions to be executed by processor **104**. Main memory **106** also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor **104**. Computer system **100** further includes a read only memory (ROM) **108** or other static storage device coupled to the bus **102** for storing static information and instructions for the processor **104**. A storage device **110**, which may be one or more of a floppy disk, a flexible disk, a hard disk, flash memory-based storage medium, magnetic tape or other magnetic storage medium, a compact disk (CD)-ROM, a digital versatile disk (DVD)-ROM, or other optical storage medium, or any other storage medium from which processor **104** can read, is provided and coupled to the bus **102** for storing information and instructions (e.g., operating systems, applications programs and the like).

Computer system **100** may be coupled via the bus **102** to a display **112**, such as a flat panel display, for displaying information to a computer user. An input device **114**, such as a keyboard including alphanumeric and other keys, is coupled to the bus **102** for communicating information and command selections to the processor **104**. Another type of user input device is cursor control device **116**, such as a mouse, a trackball, or cursor direction keys for communicating direction information and command selections to processor **104** and for controlling cursor movement on the display **112**. Other user interface devices, such as microphones, speakers, etc. are not shown in detail but may be involved with the receipt of user input and/or presentation of output.

The processes referred to herein may be implemented by processor **104** executing appropriate sequences of computer-readable instructions contained in main memory **106**. Such instructions may be read into main memory **106** from another computer-readable medium, such as storage device **110**, and execution of the sequences of instructions contained in the main memory **106** causes the processor **104** to perform the associated actions. In alternative embodiments, hard-wired circuitry or firmware-controlled processing units (e.g., field programmable gate arrays) may be used in place of or in combination with processor **104** and its associated computer software instructions to implement the invention. The computer-readable instructions may be rendered in any computer language including, without limitation, C#, C/C++, Fortran, COBOL, PASCAL, assembly language, markup languages (e.g., HTML, SGML, XML, VoXML), and the like, as well as object-oriented environments such as the Common Object Request Broker Architecture (CORBA), Java™ and the like. In general, all of the aforementioned terms are meant to encompass any series of logical steps performed in a sequence to accomplish a given purpose, which is the hallmark of any computer-executable application. Unless specifically stated otherwise, it should be appreciated that throughout the description of the present invention, use of terms such as "processing", "computing", "calculating", "determining", "displaying" or the like, refer to the action and processes of an appropriately programmed computer system, such as computer system **100** or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within its registers and memories into other data similarly represented as physical quantities within its memories or registers or other such information storage, transmission or display devices.

Computer system **100** also includes a communication interface **118** coupled to the bus **102**. Communication interface **118** provides a two-way data communication channel with a computer network, which provides connectivity to and among the various computer systems discussed above. For example, communication interface **118** may be a local area network (LAN) card to provide a data communication connection to a compatible LAN, which itself is communicatively coupled to the Internet through one or more Internet service provider networks. The precise details of such communication paths are not critical to the present invention. What is important is that computer system **100** can send and receive messages and data through the communication interface **118** and in that way communicate with hosts accessible via the Internet.

Thus, methods, network devices and machine-readable media for preventing malicious use of phishing simulation records have been described. It is to be understood that the above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

What is claimed is:

1. A computer-implemented method performed by a data processing apparatus, the method comprising:

for an individual, associating a phishing simulation record of the individual with an e-mail alias of the individual and associating the e-mail alias of the individual with a primary e-mail address of the individual;

sending via a computer network one or more simulated phishing messages to the individual via the e-mail alias associated with the individual;

generating a phishing simulation record based on a response by the individual to the one or more simulated phishing messages,

wherein, for the individual, the phishing simulation record of the individual is associated with the primary e-mail address of the individual only through the e-mail alias of the individual;

wherein, after sending the one or more messages, disassociating by a computer processor the primary e-mail address of the individual from the e-mail alias of the individual such that phishing susceptibility attribution is precluded for the individual.

2. The method of claim **1**, wherein the phishing simulation record comprises a measure of the corresponding individual's susceptibility to phishing attacks.

3. The method of claim 1, further comprising determining which of the phishing simulation records has a measure of phishing susceptibility that exceeds a threshold.

4. The method of claim 1, wherein the phishing simulation record comprises a total number of phishing simulations that the corresponding individual has fallen victim to.

5. The method of claim 4, wherein if the total number of phishing simulations that the corresponding individual has fallen victim to exceeds a threshold, then sending via the computer network one or more simulated phishing messages to the individual.

6. The method of claim 1, wherein the association between the e-mail aliases and the primary e-mail addresses is stored using encryption.

7. The method of claim 1, wherein the association between the phishing simulation records and the e-mail aliases is stored in a first data store and the association between the e-mail aliases and the primary e-mail addresses is stored in a second data store, the first data store being separate from the second data store so that even if an attacker gains access to the first data store, the attacker does not automatically gain access to the second data store.

8. The method of claim 1, further comprising:

upon detecting that one or more messages have been sent to an individual's e-mail alias, forwarding the one or more messages to the primary e-mail address of the individual.

9. The method of claim 1, wherein the one or more messages comprise one or more of phishing simulations and training materials constructed to increase an individual's awareness of phishing attacks.

10. A network device, comprising:

a processor;

a storage device connected to the processor; and

a set of instructions on the storage device that, when executed by the processor, cause the processor to:

for an individual, associate a phishing simulation record of the individual with an e-mail alias of the individual and associate the e-mail alias of the individual with a primary e-mail address of the individual;

sending one or more simulated phishing messages to the individual via the e-mail alias associated with the individual;

generating a phishing simulation record based on a response by the individual to the one or more simulated phishing messages,

wherein, for the individual, the phishing simulation record of the individual is associated with the primary e-mail address of the individual only through the e-mail alias of the individual;

wherein, after sending the one or more messages, disassociating by a computer processor the primary e-mail address of the individual from the e-mail alias of the individual such that phishing susceptibility attribution is precluded for the individual.

11. A non-transitory machine-readable storage medium comprising software instructions that, when executed by a processor, cause the processor to:

for an individual, associate a phishing simulation record of the individual with an e-mail alias of the individual and associate the e-mail alias of the individual with a primary e-mail address of the individual;

sending one or more simulated phishing messages to the individual via the e-mail alias associated with the individual;

generating a phishing simulation record based on a response by the individual to the one or more simulated phishing messages,

wherein, for the individual, the phishing simulation record of the individual is associated with the primary e-mail address of the individual only through the e-mail alias of the individual;

wherein, after sending the one or more messages, disassociating by a computer processor the primary e-mail address of the individual from the e-mail alias of the individual such that phishing susceptibility attribution is precluded for the individual.

12. The method of claim 10, the instructions further comprising instructions for determining which of the phishing simulation records has a measure of phishing susceptibility that exceeds a threshold.

13. The method of claim 10, wherein the phishing simulation record comprises a total number of phishing simulations that the corresponding individual has fallen victim to.

14. The method of claim 10, wherein if the total number of phishing simulations that the corresponding individual has fallen victim to exceeds a threshold, then sending via the computer network one or more simulated phishing messages to the individual.

15. The non-transitory machine-readable storage medium of claim 11, the instructions further comprising instructions for determining which of the phishing simulation records has a measure of phishing susceptibility that exceeds a threshold.

16. The non-transitory machine-readable storage medium of claim 11, wherein the phishing simulation record comprises a total number of phishing simulations that the corresponding individual has fallen victim to.

17. The non-transitory machine-readable storage medium of claim 11, wherein if the total number of phishing simulations that the corresponding individual has fallen victim to exceeds a threshold, then sending via the computer network one or more simulated phishing messages to the individual.

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